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Enhancement of the Long-range Ultrasonic Method for the Detection of Degradation in Buried, Unpiggable Pipelines

The objective of this research is to improve and/or enhance a non-intrusive nondestructive technology already in use for pipeline inspections. This technique only requires access to the outside of the pipe. Refits and/or modifications are not necessary to assess the condition of a line using guided wave ultrasonic inspection. The research addresses three primary tasks:

1. To benchmark the test performance of the guided wave method against that of internal inspection vehicles (pigs) and to correlate guided wave data gathered in the field with the actual existing pipe conditions whenever the pipe is exposed for verification or removed for replacement.
2. Improving the guided wave ultrasonic capability to provide more quantitative data on anomalies that require interpretation.
3. And to introduce a new sound beam focusing technique for improved sensitivity and range of inspection.

Progress on this project in the first 15 months was in accordance with the objectives defined for this time period. The following areas were investigated and the results are summarized as follows:

1. Preliminary Guided Wave focusing research was initiated during the last quarter. The mathematical modeling for focusing has now moved into the laboratory. The deconvolution algorithms are now being tried on real pipe with the reconfigured guided wave equipment set and software specifically developed to facilitate sound focusing. During the last two periods the equipment and software were upgraded to allow the focusing studies and experiments to proceed.
2. Guided wave inspections are now being performed on existing pipelines. Field situations where anomalies are identified are being evaluated by direct comparison, i.e., guided wave data vs. as-found pipe condition. These data are being logged and described for further study. So far, 630 of feet of condemned pipe has been studied and the field results correlated with the actual pipe condition and two of three cased pipe sections have been inspected and verified. Additional inspections have been completed on gas pipe in service that will be excavated within the next quarter.

Questions concerning this project should be directed to the Team Project Manager as follows:

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